

## ABSTRACT OF THE DISCLOSURE

A method and apparatus for locally raising the temperature of a material in order to facilitate chemical reactions or processes related to growth or removal of the material utilizes an electrode to apply, in the presence of a growth or removal medium, a controlled succession of thermal spikes or shockwaves of varying energy. The scale of the thermal spikes or shockwaves, and the area of the material affected by the resulting energy transfer, is on the order of a few nanometers to several hundred micrometers, and the duration of the thermal spikes or shockwaves ranges from a few picoseconds to several hundred nanoseconds. The growth or removal medium may be a cryogenic liquid, although other growth media, including liquids, solids, gases in critical or non-critical state, and mixtures of liquids and solids, solids and gases, and liquids and gases, may also be employed. The electrode may be an electrode emitter tip or, in some cases, may serve as an anode for electrodes drawn from the workpiece or growth or removal medium.

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